

1.9.12

AI24BTECH11021 - Manvik Muthyapu

Question:

Find the length of the segment joining **A**(-6, 7) and **B**(-1, -5). Also, find the midpoint of **AB**. (10, 2021)

Solution:

A = $\begin{pmatrix} -6 \\ 7 \end{pmatrix}$ and **B** = $\begin{pmatrix} -1 \\ -5 \end{pmatrix}$, then length of line segment is $\|B - A\|$.

$$B - A = \begin{pmatrix} -1 \\ -5 \end{pmatrix} - \begin{pmatrix} -6 \\ 7 \end{pmatrix} \quad (1)$$

$$= \begin{pmatrix} 5 \\ -12 \end{pmatrix} \quad (2)$$

$$\|B - A\| = \sqrt{(B - A)^T(B - A)} \quad (3)$$

$$= \sqrt{(5)^2 + (-12)^2} = \sqrt{169} \quad (4)$$

$$= 13 \quad (5)$$

\therefore The length of line segment is 13 units.

Midpoint **M** of **AB** is $\frac{A+B}{2}$

$$M = \frac{A + B}{2} \quad (6)$$

$$= \frac{\begin{pmatrix} -6 \\ 7 \end{pmatrix} + \begin{pmatrix} -1 \\ -5 \end{pmatrix}}{2} = \frac{\begin{pmatrix} -7 \\ 2 \end{pmatrix}}{2} \quad (7)$$

$$= \begin{pmatrix} -3.5 \\ 1 \end{pmatrix} \quad (8)$$

